Appendix J

Groundwater Impacts Analysis at SRWTP Site

BACKGROUND

The main wastewater flow received at the SRWTP is contained at all times either in closed pipes or in concrete treatment process basins or tanks. The only possible exposure of wastewater constituents to groundwater associated with the current operation of the SRWTP could occur as a result of the following side-stream wastewater treatment operations and legacy facilities:

- Emergency Storage Basins (ESB)
- Solids Storage Basins (SSB)
- Dedicated Land Disposal Units (DLD)
- Grit and Screenings Landfill (Closed)

These facilities and their associated operations are described below along with their potential for impacts on groundwater quality and mitigation measures that have been implemented by SRCSD in recent years to minimize the potential for groundwater impacts.

EMERGENCY STORAGE BASINS (ESB)

There are five ESBs located north of the main treatment process area, designated A, B, C, D, and E. The capacity and lining status of the five basins are summarized in **Table 1**

Table 1: Emergency Storage Basin Design Data.

ESB No.	Storage Capacity (MG)	Lining Status
A	15.5	Concrete
B	31.5	Unlined
C	175.0	Unlined
D	60.0	Membrane
E	20.0	Unlined

ESB-A, B, and C are designed to receive short duration, wet-weather influent flows after headworks treatment that exceed the hydraulic capacity of the treatment process train (387 mgd), which is based on the 2-year peak hourly wet weather flow. Excess wet-weather flow is diverted first to ESB-A and sequentially to ESB-B and ESB-C if the diverted flow volume exceeds the storage capacity of the receiving basin. Diverted flows are returned to the SRWTP headworks for treatment as soon as influent flows decrease below the treatment process design hydraulic capacity. Only the unlined basins B and C have the potential to infiltrate wastewater to groundwater. Depending on the nature of the wet-weather flow event, wastewater may, on rare occasions, be temporarily stored in basins ESB-B and ESB-C for short periods, typically less than 24 hours. Thus the potential for percolation from these two basins to impact the

groundwater quality is considered insignificant based on the following reasons (SCDERA, 2004):

- The volume of potential percolation to the groundwater will be very limited due to the infrequent occurrence and short duration of storage events;
- The underlying soils are low permeability clay soils, which limit the rate of infiltration of water into the soil;
- Permeability of the infiltrative surface of the basins has been further reduced by deposition of fine material from past diversions; and
- The water depths during storage are typically very shallow, which limits the hydraulic gradient and thus the rate of infiltration into the soil.

The operation of these three basins for influent diversion would not change significantly if the discharge from the SRWTP were expanded to 218 mgd. Thus no increase in the potential for impact to groundwater associated with ESB-A, B, and C is expected with expansion of discharge to 218 mgd (SRCSD, 2004a).

ESB-A is also used periodically during the dry season to store process effluent (e.g. primary or secondary effluent) for short duration, typically 4-6 hours, when a process unit must be taken out of service for maintenance. Because ESB-A is concrete lined, there is no potential for groundwater impact due to this basin operation. This operation would not change if the discharge from the SRWTP were expanded to 218 mgd.

ESB-D is used routinely to receive and temporarily store fully treated effluent for short periods when river to effluent flow ratios are less than 14:1. The current NPDES permit prohibits discharge to the river at flow ratios less than 14:1. These effluent diversions to ESB-D to comply with dilution requirements are necessary when tidal influence reduces the flow of the river. Diversion events typically last for a few hours. Because ESB-D is lined, the potential for seepage from this basin to impact the groundwater is considered insignificant. If the diversion volume were to exceed the storage capacity of ESB-D, effluent would overflow into ESB-C. However, overflow of ESB-D is a very unlikely event, and the potential for impact to groundwater as a result of overflow to ESB-C is considered insignificant. Hydraulic analysis results indicate that ESB-D is adequately sized to function as a temporary storage basin under the conditions of 218 mgd (ADWF) discharge and worst-case drought flow condition in the river. Thus the size and operation of ESB-D would not change if the discharge from the SRWTP were expanded to 218 mgd. Consequently, no increase in the potential for impact to groundwater associated with ESB-D would be expected with expansion of SRWTP discharge to 218 mgd.

ESB-E is an emergency storage basin designed to receive raw wastewater to provide surge protection to the influent pumping station. ESB-E has never been used and the likelihood of its use would not increase with expansion of treatment facilities to meet the proposed 218 mgd discharge. Thus no increase in the potential for impact to groundwater associated with ESB-E is expected with expansion of SRWTP discharge to 218 mgd.

SOLIDS STORAGE BASINS (SSB)

Digested biosolids are transferred to Solids Storage Basins (SSBs) in which they are stored for periods of up to five years prior to removal and application on Dedicated Land Disposal units located on the SRWTP site. The SSBs comprise 20 separate basins covering a total land area of approximately 150 acres. The basins are unlined; however, the biosolids form a layer of material that acts as a low permeability membrane between the stored biosolids and the underlying soils. The self-sealing character of the biosolids overlying naturally occurring low permeability soils in the area of the SSBs limits seepage of liquid from the basins to the groundwater (SCDERA, 2003).

Although seepage from the SSBs is expected to be limited, the SSBs are recognized as a potential source of groundwater recharge and constituents of concern (SRCSD, 2009a). The groundwater is monitored up-gradient and down-gradient of the SSBs in accordance with the Monitoring and Reporting Program specified in Order No. R5-2003-0076. In accordance with an agreement with the Central Valley Regional Water Board, SCRSD is currently in the process of installing additional monitoring wells down gradient of the SSBs to better detect and monitor any impacts of the SSBs on the groundwater (SRCSD, 2007). The groundwater monitoring and reporting process is intended to detect groundwater impacts and trigger mitigation actions, as appropriate. In addition, the operation of the CAP system, described below, will act to mitigate any groundwater impacts associated with operation of the SSBs. The size or operation of the SSBs would not change if discharge from the SRWTP were expanded to 218 mgd. Thus, no increase in the potential for impact to groundwater associated with the SSBs is expected with expansion of SRWTP discharge to 218 mgd.

DEDICATED LAND DISPOSAL UNITS (DLD)

The current DLD system consists of three lined, 37-acre units designed to receive stabilized biosolids from the SSBs by subsurface injection six to eight inches below the surface soil. Two of the original five DLD units were taken out of service and the remaining three units were lined with synthetic membranes in 2002 and 2003 as a response to mitigate salt and nitrate groundwater impacts detected in the vicinity of the DLD units. The lined units were also equipped with a leachate collection system designed to capture and return leachate from the DLD units to the treatment plant headworks to prevent seepage of leachate to the groundwater. The DLD units and the leachate collection systems are monitored in accordance with the monitoring and reporting requirements of Order No. R5-2003-0076. The liners and leachate collection systems are considered adequate to prevent further groundwater impacts associated with the operation of the DLD units. The size of the DLD units would not change as result of an increase in discharge from the SRWTP to 218 mgd. Thus no increase in the potential for impact to groundwater associated with the DLD units is expected with expansion of SRWTP discharge to 218 mgd.

CLOSED LANDFILL AND GROUNDWATER CORRECTIVE ACTION PLAN (CAP)

A groundwater corrective action plan (CAP) was first implemented in 1995 in response to detected groundwater impacts (salts and nitrate) from previous practices (seepage pits, grit and screenings landfill, dairy). The CAP involves the operation of a system of extraction wells designed to remove contaminated groundwater from below these sites and blend the extracted water with the SRWTP effluent prior to disinfection and river discharge. The purpose of the

CAP system is to remedy the impacts and prevent movement of contaminated groundwater beyond the SRWTP site. The CAP system was expanded in 2001 to provide mitigation of detected impacts due to the operation of the DLD units. The CAP system received substantial repairs and improvements in 2006 and has been in full operation since (SRCSD, 2009a). The current system is designed to extract groundwater at a maximum rate of approximately 800 gpm. The CAP system is monitored in accordance with the monitoring and reporting requirements of Order No. R5-2003-0076.

SUMMARY OF POTENTIAL GROUNDWATER IMPACTS

The only possible exposure of wastewater constituents to groundwater associated with the current operation of the SRWTP could occur as a result of the following side-stream waterwater treatment operations and legacy facilities:

- Emergency Storage Basins (ESBs)
- Solids Storage Basins (SSBs)
- Dedicated Land Disposal Units (DLDs)
- Grit and Screenings Landfill (Closed)

No increase in the potential for impact to groundwater quality associated with these facilities is expected with expansion of discharge to 218 mgd (ADWF) for the following reasons:

Emergency Storage Basins (ESBs) – ESB-A and ESB-D are lined and, consequently, have no potential to impact groundwater quality as a result of percolation. Unlined basins, ESB-B, ESB-C, and ESB-E, are considered to have no significant impact on groundwater quality under current operating conditions because of their very low frequency of used and low rates of infiltration. The physical size or methods of operation of these basins All of the facilities at the SRWTP that could potentially impact groundwater quality – Emergency Storage Basins (ESBs), Solids Storage Basins (SSBs), and Dedicated Land Disposal units (DLDs) – would not change in terms of their physical size or methods of operation if the discharge from the SRWTP were expanded to 218 mgd. In addition, the period of time that water would be stored in unlined basins is not expected to increase significantly as a result of an increase in the treatment capacity to 218 mgd. Thus, no increase in the potential for impact to groundwater associated with these facilities would be expected with expansion of discharge to 218 mgd.

Solids Storage Basins (SSBs) – the size or operation of the SSBs would not change if the discharge from the SRWTP were expanded to 218 mgd.

Dedicated Land Disposal Units (DLDs) – the DLD units have been lined to prevent percolation of leachate to the underlying groundwater.

Closed Grit and Screenings Landfill – the impacts of the closed landfill and other legacy operations (seepage pits and dairy) at the SRWTP on groundwater quality are currently being mitigated through operation of the CAP system, which extracts impacted groundwater and discharges it with SRWTP effluent.